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GB 2245776 A GB 2057784 A US 3264602 A

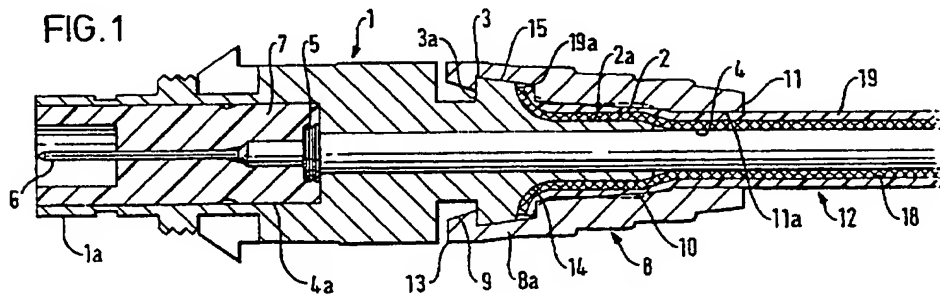
(58) **Field of Search**

UK CL (Edition 0) H2E

INT CL⁶ H01R

(54) **Electrical connector with a body and snap-on cap**

(57) A connector comprises a body 1 which includes a hollow ferrule 2 and a flanged portion 3 and a cap 8 which includes an aperture 11a, an outer flared portion 8a with hook means 9 and protrusions 10. The connector is arranged such that the flared portion 8a can be slid over the flanged portion 3 to hook the hook means 9 around the flange 3 to provide a snap-on engagement between the body 1 and the cap 8. The protrusions 10 are suitably arranged for forcing part of a cable 12 into contact with the outer surface 2a of the ferrule. The flanged portion 3 may be a tapered ring flange, the hook means 9 may be one or more circumferentially distributed lugs and the outer surface of the ferrule 2a may be arcuately curved. The widening of the flared portion 8 may induce a tightening of the aperture 11a to pinch the cable 12. This arrangement may be used for a coaxial cable connector and a grab-wire device 5 may be used to receive the inner conductor. Alternatively the above arrangement may be used for a cable feed-through clamping means (figures 3 and 4). Also claimed is an arrangement in which a body 1 has a flange 3 and an arcuately flared surface 2a between one end and the flange which can be engaged and hooked by a resilient cap 8 with protuberances 10 such that the protuberances 10 are adjacent to said flared surface 2a.



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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FIG. 1

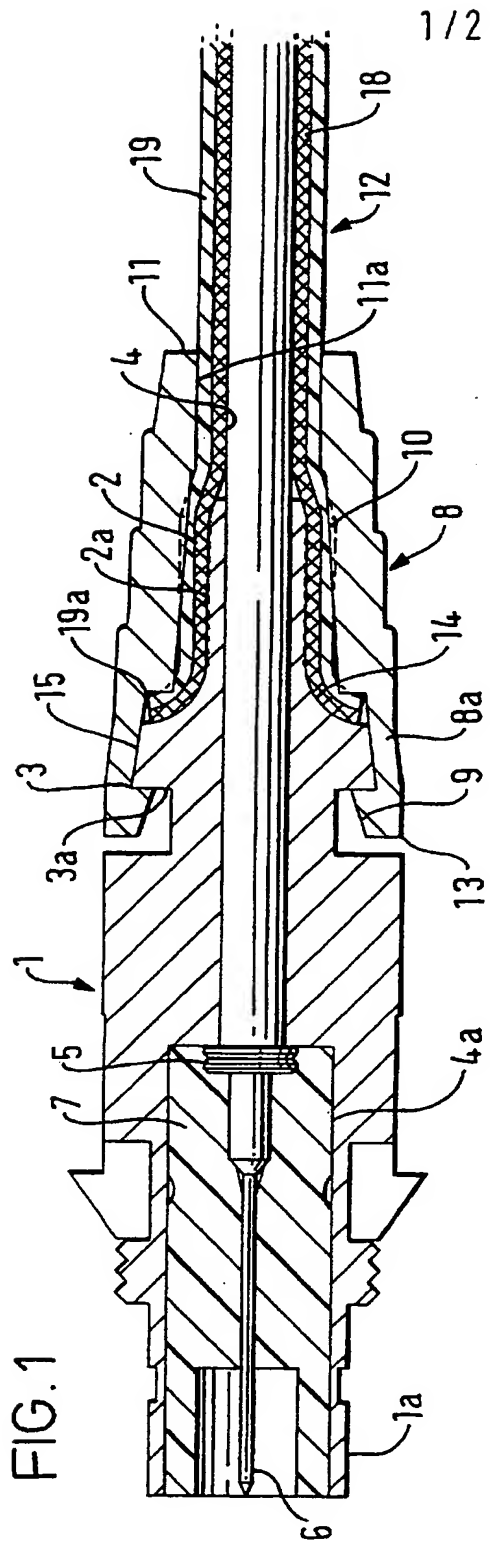
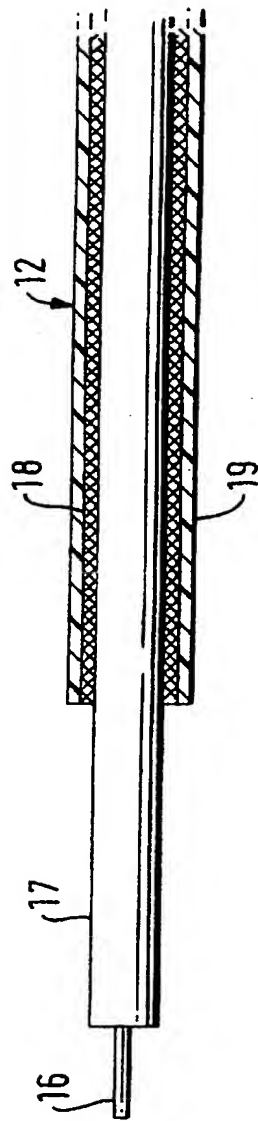


FIG. 2



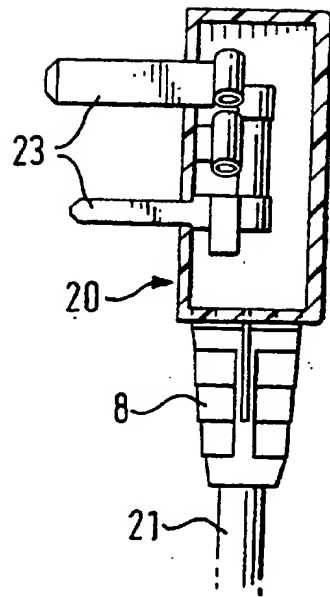


FIG. 3

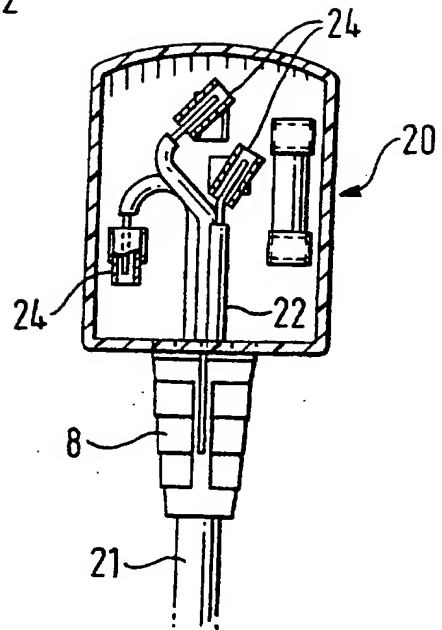


FIG. 4

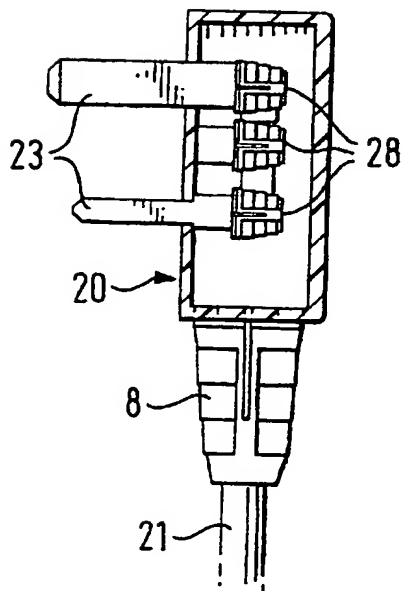


FIG. 5

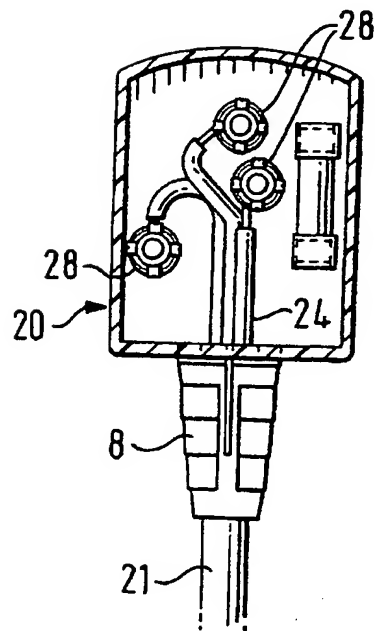


FIG. 6

CABLE CONNECTORS

The present invention relates to connectors.

5 One aspect of the invention concerns connectors for coaxial cable of the kind comprising an inner conductor, a dielectric core around the inner conductor, an outer conductor in the form of a braided conductive screen, and an outer sheath. Such a cable is extensively used domestically
10 and industrially for the transmission of radio frequency signals.

It is customary to couple coaxial cables of this kind to output or input coaxial ports of electric equipment by a
15 terminal connector which normally comprises a conductive body against which the screening braid is urged into contact by one means or another, the body having a passageway for the reception of the dielectric core and inner conductor. In some forms of connector, the inner conductor is required
20 to terminate in a pin disposed coaxially with and centrally of a cylindrical terminal part of the body. Connectors of this general kind exist in many different forms and designs. Traditionally, they have required a multiplicity of separate parts and the assembly of the connector including the cable
25 having an end secured to and within the connector has required considerable dexterity. The assembly of the connector with the cable has usually required, depending on the design, the use of solder or crimping or both and in practice consumes considerable time.

30 It is one object of the invention to provide a form of connector with which a cable, particularly a coaxial cable, may be simply and reliably connected.

A further or alternative object of the invention is to provide a connector having very few distinct parts and which is easy to assemble.

5 The present invention in a preferred form is based on a body which has a ferrule extension for the reception of the inner part, normally the dielectric core and inner conductor, of coaxial cable, a lateral extension from the body having a tapered or bevelled surface, and a cap which is apertured
10 for the accommodation of the cable and which has means extending for engagement with the lateral extension and adapted to be laterally enlarged on engagement with the lateral extension and relaxing into a hooked relationship therewith. The cap preferably includes internal means such
15 as tines for engagement with the outside of the coaxial cable and for urging its screening braid into engagement with the outer surface of the ferrule, which is shaped to facilitate the engagement of the outside of the cable by the tines. The cap may be adapted so that it constricts the
20 cable at the top end of the cap when its lower end is enlarged by engagement with the lateral extension, which may be in the form of a ring. The cap may include a flared part or skirt of which the inner surface engages with the bevelled or tapered part of the ring, having lugs or hooks
25 for engaging an abutment shoulder of the ring.

A similar construction of connector may be employed for cable other than coaxial cable, to secure a cable or a wire to a mains plug, terminal fitting or the like.

30 Further features of the invention will be apparent from the following description which is given by way of example and with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a sectional view of one example of a connector in use with an attached single core coaxial cable.

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Figure 2 is a partly sectioned view of a stripped free end of a single core coaxial cable.

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Figures 3 and 4 illustrate a connector forming part of a multi-pin mains plug.

Figures 5 and 6 illustrate connectors for individual terminal pins in a mains plug.

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DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Figure 1 illustrates one example of a terminal connector in accordance with the invention. The connector comprises a body 1 which may be in generally cylindrical form and would normally consist of conductive material. At a right hand end, hereinafter called rearward end, of the body is a ferrule extension 2, which preferably has a knurled outer surface 2a. Laterally extending from the body in the region of the ferrule extension is a lateral extension in the form of a ring-shaped flange 3 of which the outer surface 15 is bevelled or tapered to form a cam surface. The left hand side of the ring constitutes an abutment shoulder 3a for a purpose to be described.

30

The body 1 and the ferrule extension 2 have an internal passageway 4 extending lengthwise of the ferrule and the body. This passageway will accommodate the inner part, constituted by the dielectric core 17 and inner conductor 16, of the cable 12 which is shown in Figure 2. As is customary, the cable includes an outer part comprising a braided screen 18 and an insulating sheath 19 which is

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usually composed of a suitable flexible polymeric insulating material.

- 5 In this particular embodiment of the invention, the connector is provided with a customary termination constituted by a pin 6 disposed coaxially within a forward generally cylindrical part 1a of the body 1. The pin is disposed within an insulating insert 7 accommodated in an enlarged part 4a of the central passageway 4 within the body
- 10 1. The pin 6 is secured to a grab-wire device 5 of a kind generally known in the art. Such a device is capable of receiving by means of a simple inserting movement, and holding securely the inner conductor of the coaxial cable.
- 15 The grab-wire device 5 may, for example, comprise at the end adapted to receive the inner conductor, inwardly turned flexible metal parts of which the spacing is less than the diameter of the inner conductor, so that the parts can receive the conductor but resist extraction of the
- 20 conductor. The incorporation of a grab-wire holder for the inner conductor is desirable because it facilitates the construction of a connector which has a minimum of separable parts and which is easily made up with a cable.
- 25 It may be noticed that in the present embodiment, the grab-wire device 5, the insulating insert 7 and the pin 6 may remain permanently within the body, which in effect comprises a single part unit which does not require disassembly before a cable is inserted.
- 30 The present embodiment is effectively a two-part connector of which the second part is a cap 8 which co-operates with the ferrule and the lateral flange 3 of the body to engage and retain the outer parts of the coaxial cable.
- 35 In particular, the cap 8 has a distal part 11 which has an

aperture 11a for accommodating the passage of the cable 12. This aperture may be of substantially the same or slightly lesser diameter than the outer diameter of the cable so that, as will be seen, the cap can be stressed to pinch the cable when it is stressed by enlargement of the proximal part of the cap.

The proximal part of the cap is in the form of an outwardly flared skirt 8a which has an inwardly extending rim 13 adapted to form a plurality of circumferentially spaced lugs, which engage the inner or forward surface 3a of the annular flange 3.

Within the cap, at the upper end of the skirt, are internal protuberances or tines 10 positioned for engagement with the outer sheath of the cable. These features preferably extend the majority of the distance to the proximal end of the skirt.

The outer surface 2a of the ferrule extension is arcuately flared towards the flange 3 so that it has a concave annular shoulder 14. The tines 10 extend sufficiently to engage that part of the outer sheath which overlies the shoulder and is flared by the shoulder to form an annular lip 19a. It may be seen that the lip 19a of the outer sheath makes a substantial angle, somewhat greater than 45 degrees and approaching a right angle, with the axis of the connector. Thus the outer sheath 19, and preferably also the screening braid 18, is securely engaged by the tines 10 and is pinched between the tines 10 and the shoulder 14.

The lugs 9 of the skirt are bevelled so that when they slide over the flange 3 this end of the cap is outwardly enlarged.

In order to use a connector of the kind shown in Figure 1,

the coaxial cable should first be stripped so as to leave a suitable length of the dielectric core exposed, there being a suitable length of inner conductor extending from the exposed length of dielectric core. The cap should be slid
5 over the cable, the cable passing through the aperture in the cap. The cable is then offered up to the ferrule extension of the connector. The inner conductor 16 and the dielectric core 17 pass into the passageway 4 of the body of the connector. When the cable is pushed fully into the
10 connector, the dielectric core butts against the grab-wire device and the inner conductor passes into the grab-wire device to be held thereby. At the same time, the screening braid 18 and the outer sheath can be manipulated over the ferrule extension 2. The screening braid and outer sheath
15 may abut the shoulder 14.

The cap 8 may then be pushed on to the body. The lugs 9 slide over the bevelled outer surface of the ring flange 3 until they pass beyond the inner end of the ring whereupon
20 the skirt relaxes into secure engagement with the ring, being held thereon by the stressed state of the cap and the engagement of the lugs with the ring.

The internal parts 10 of the stressed cap can bite into the
25 outer sheath of the cable as previously described and the forced opening of the proximal end of the skirt will also cause the distal end of the cap to pinch the cable, thereby ensuring a strong mechanical anchoring of the cable. The connector is now ready for use.

30
Figures 3 and 4 are partly cut-away views of a mains plug 20 which is adapted to co-operate with a cap 8 as previously described to anchor a cable 21, such as a three core or twin-and-earth cable. The plug 20 may include laterally
35 spaced surfaces which are disposed for engagement by the rim of the cap's skirt in a manner similar to the engagement of

the flange 3 by the skirt 8a as shown in Figure 1. The cap may engage the outer sheath of the cable as previously described. The inner wires 22 of the cable may be connected to the respective terminal pins 23 by grab-wire devices 24.

5

Figures 5 and 6 illustrate a yet further embodiment of the invention, wherein the outer sheath of the cable 20 is engaged by a cap 8 as shown in Figures 3 and 4 and each individual wire 22 is connected to a terminal pin using a cap 28. Such a cap may resemble the cap 8 but is substantially smaller and may have a side aperture for receiving the wire that is to be secured to the pin by the cap 28.

10

CLAIMS

1. A connector for cable, comprising:

5 a body (1) having a hollow ferrule extension (2) and a laterally flanged portion (3); and

10 a cap (8) having an apertured end and an outwardly flared part (8a) which includes inwardly extending means (9) whereby the outwardly flared part can be slid over the flanged portion of the body and thereafter relax into a hooked engagement with the flanged portion, the cap including internal tines or protuberances (10) for engaging the outside of the cable and forcing part of the cable into
15 contact with an outer surface (2a) of the ferrule.

2. A connector according to claim 1 wherein the laterally flanged portion (3) comprises a ring having an outer peripheral surface (15) which is bevelled or tapered.
20

3. A connector according to claim 2 wherein the inwardly extending means (9) comprises a plurality of circumferentially spaced lugs.

25 4. A connector according to any foregoing claim wherein the said outer surface (2a) is arcuately flared to constitute a concave shoulder (14) whereby the said part of the cable is formed into a curved lip.

30 5. A connector according to any foregoing claim wherein the cap (8) is configured such that the engagement of the outwardly flared part (8a) of the cap with said flanged portion of the body widens said flared part and causes the apertured part (11a) of the cap to pinch the cable.

35 6. A connector for coaxial cable of the kind comprising an

inner part comprising an inner conductor (16) and a dielectric core (17) and an outer part comprising a braided screen (18) and a flexible sheath (19), comprising:

5 a body (1) having a hollow ferrule extension (2) disposed for reception of the said inner part of the cable within the ferrule and said outer part of the cable on the outside of the ferrule, and a part (3) which extends laterally
10 outwardly with respect to the ferrule, the ferrule having an arcuately flared surface (2a) between one end and said part of said body; and

a cap (8) which is apertured for the passage of the cable and has a flared portion (8a) adapted to slide over said
15 tapered surface, said flared portion being thereby stressed, and being adapted for hooked engagement with said part, the cap having internal tines or protuberances (10) for urging the outer part of the cable onto the said surface of the ferrule.

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7. A connector according to claim 6 wherein the said part (3) of the body comprises a ring flange.

8. A connector according to any foregoing claim wherein the
25 cap (8) is configured such that the engagement of the flared portion (8a) of the cap with said part of the body widens said flared portion of the cap and causes the apertured part of the cap to pinch the cable.

30 9. A connector according to any of claims 6 to 8 and including within said body a grab-wire device (5) positioned for receiving the inner conductor (16).

10. A connector comprising:

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a body (1) having a lateral flange part (3) and an arcuately

flared surface (2a) between one end and said flange part;
and

5 a resilient cap (8) having an outwardly flared part (8a)
which includes an inwardly extending part (9) whereby the
outwardly flared part can be slid over the said flange part
of the body and thereafter relax into a hooked engagement
with the said flange part; and internal tines (10)
10 extending from the cap so as to lie adjacent said flared
surface (2a).

11. A connector according to claim 10 wherein the cap
has an aperture (11a) for the passage of a cable.

15 12. A connector according to claim 11 wherein the cap is
configured such that the engagement of the outwardly flared
part (8a) with said portions of the body widens said flared
part and causes the apertured part (11a) of the cap to pinch
the cable.

Patents Act 1977 Examiner's report to the Comptroller under Section 17 (The Search report)		Application number GB 9523012.4
Relevant Technical Fields (i) UK Cl (Ed.O) H2E (ii) Int Cl (Ed.6) H01R		Search Examiner J A WATT
Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications.		Date of completion of Search 17 JANUARY 1996
(ii)		Documents considered relevant following a search in respect of Claims :- 1-9

Categories of documents

X: Document indicating lack of novelty or of inventive step.	P: Document published on or after the declared priority date but before the filing date of the present application.
Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.	E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.
A: Document indicating technological background and/or state of the art.	&: Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
A	GB 2245776 A	(RANTON & COMPANY) Figure 1, note the cap hook 56 and body flange part 58 and the tines 48A, B and the protuberances 54A, B	1
A	GB 2057784 A	(BUNKER RAMO) Figure 7	1
A	US 3264602 A	(AUTOMATIC METAL PRODUCTS) Figures 1-3	1

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).